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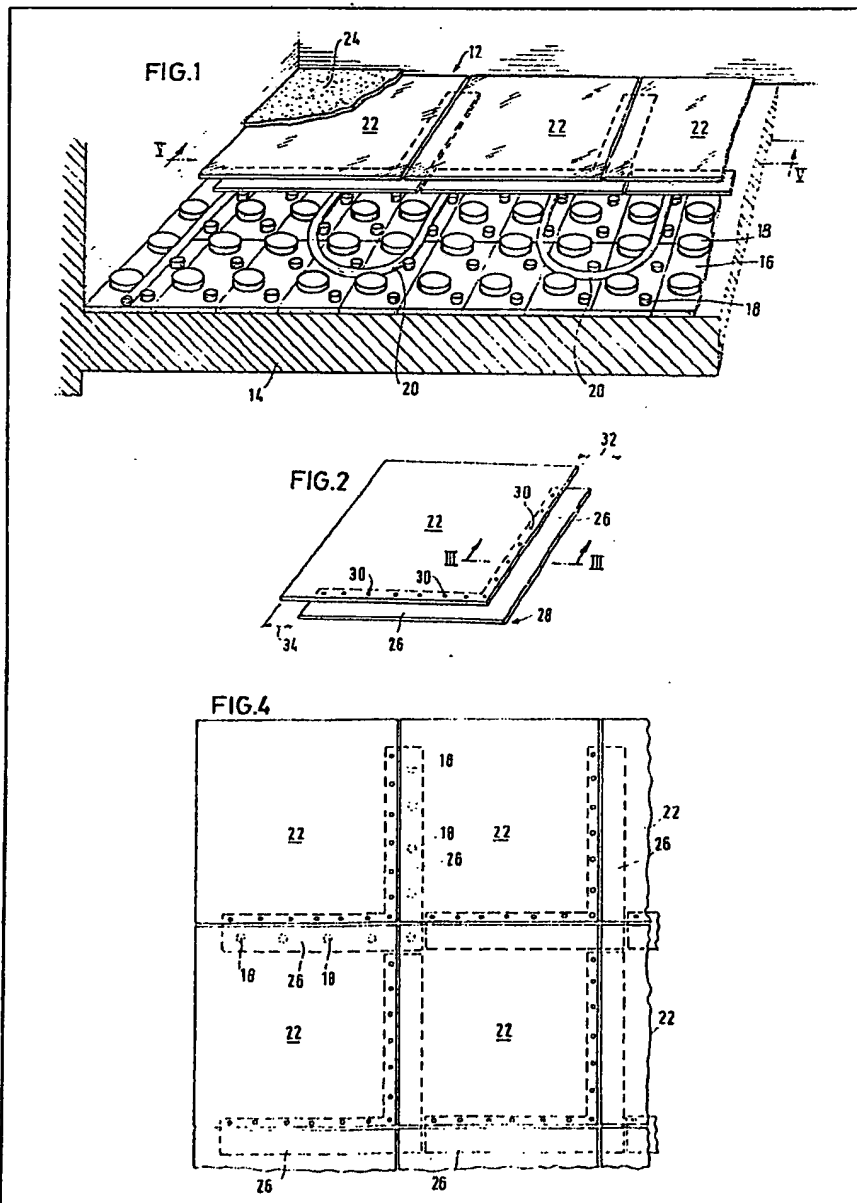
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(54) **Allowing for thermal expansion of elevated flooring having underfloor heating pipes**

(57) A floor unit includes a mounting plate 16, having knobs 18 projecting from the upper surface, and a sheet steel floor plate 22 adhesively secured to knobs 18. Between the knobs are heating pipes 12. Floor plate 22 has

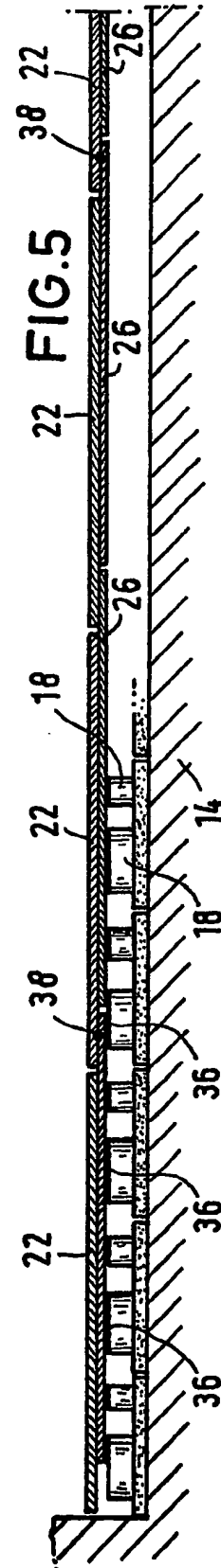
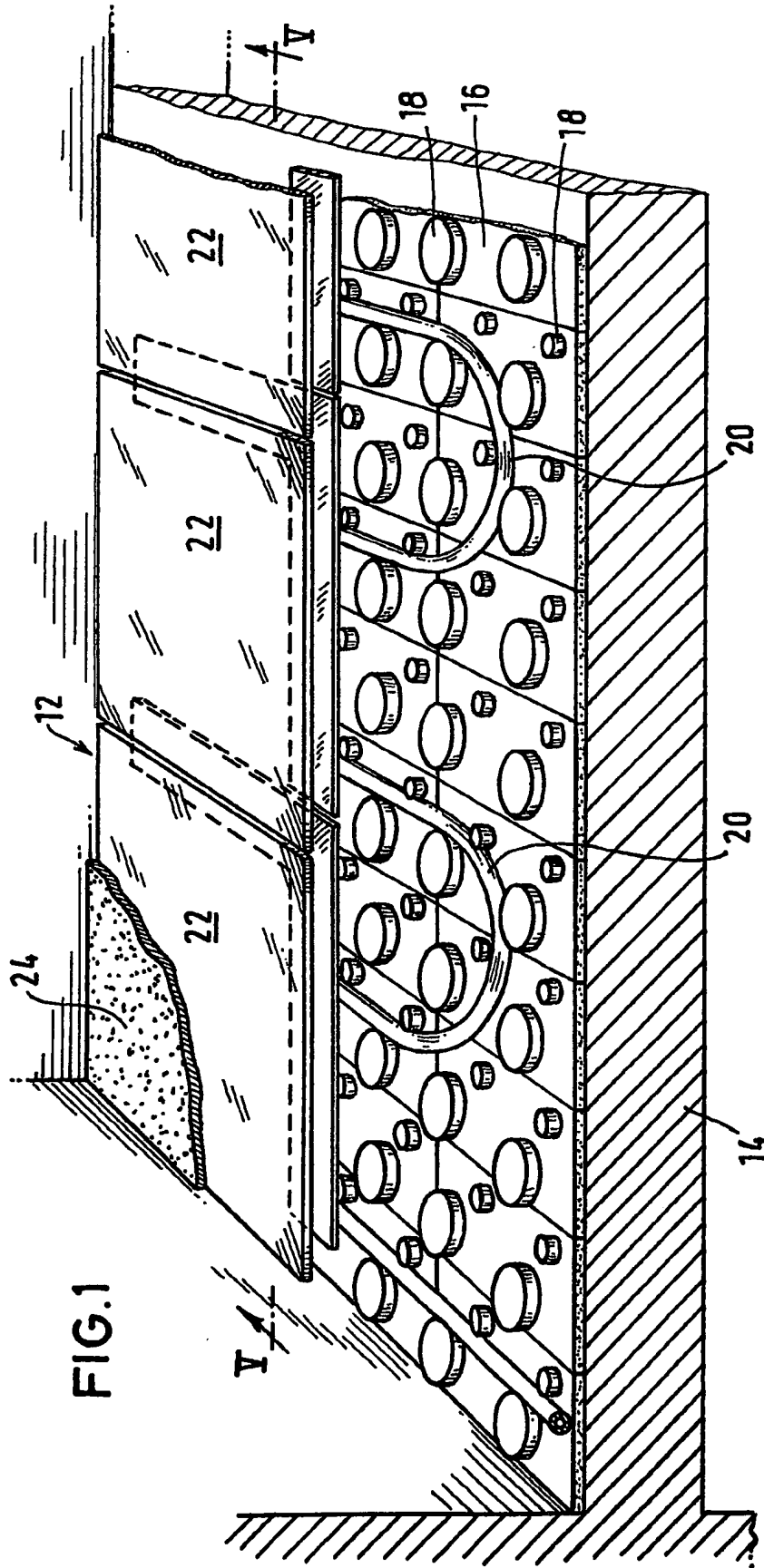
edge strips 26 which project at two mutually abutting sides and which engage below adjacent sheet steel floor plates, thus providing a smooth upper surface and compensating for thermal stresses.

Mounting plates 16 are located on supporting floor 14, and a floor covering 24 is glued on floor plates 22.



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FIG.2

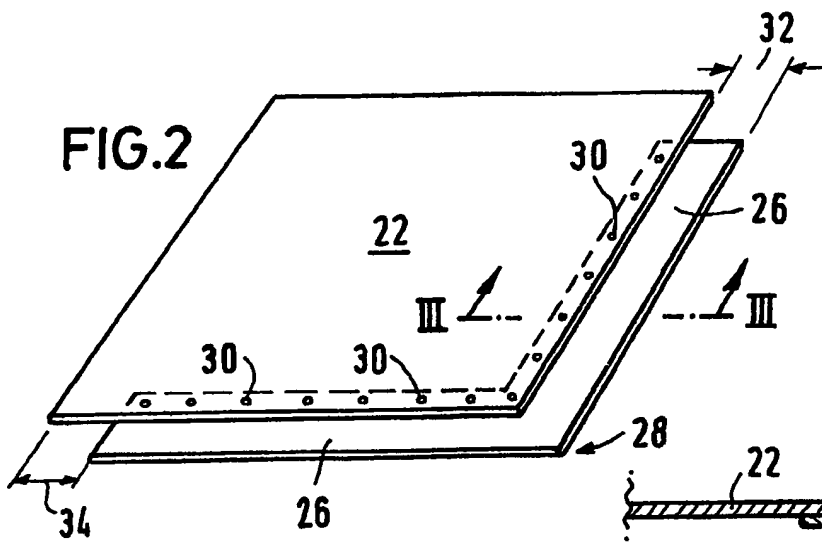


FIG.3

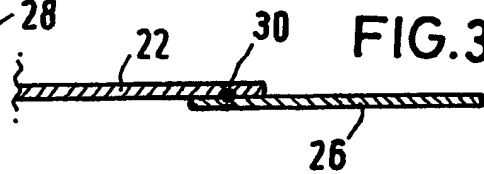
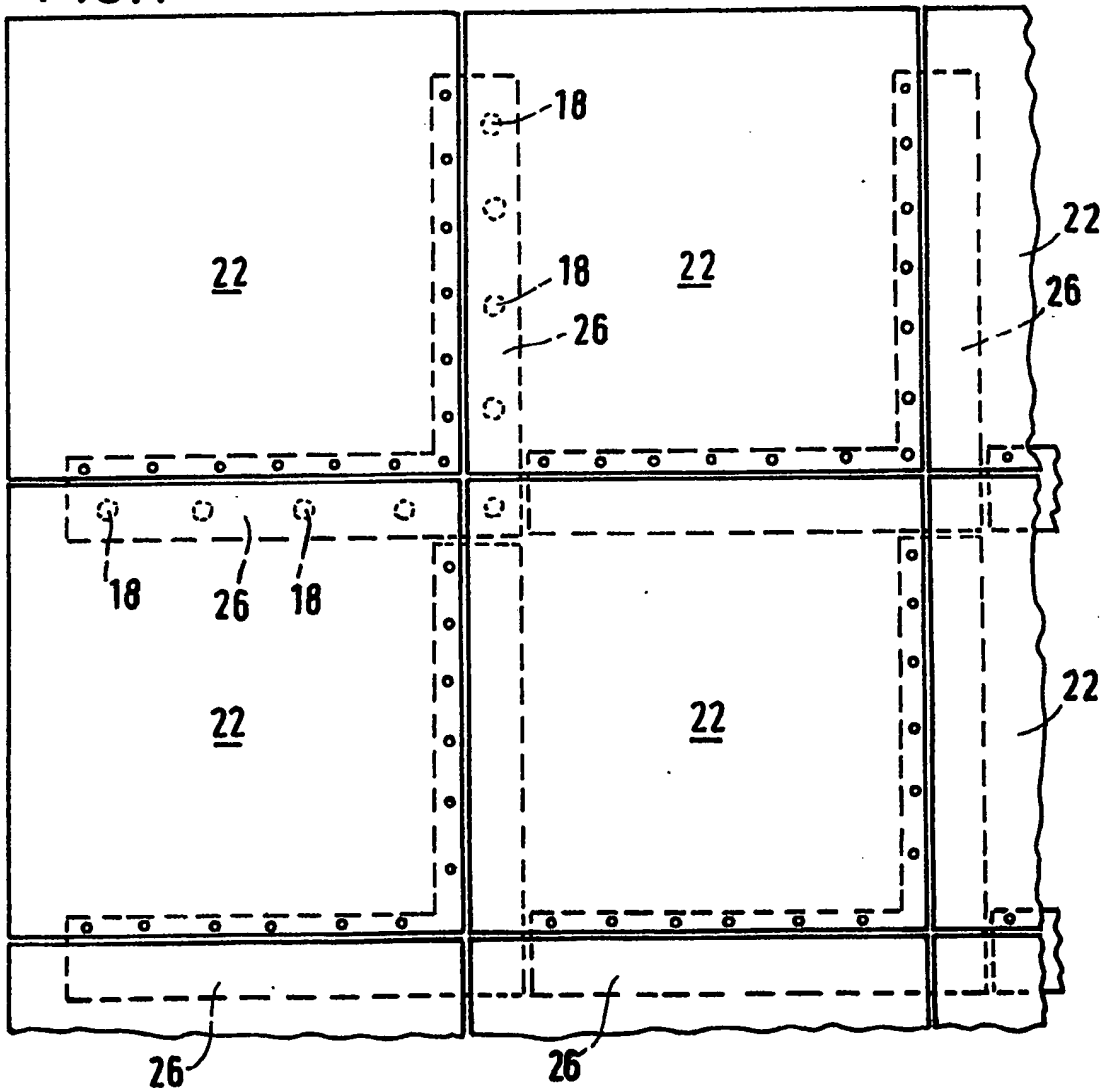


FIG.4



## SPECIFICATION Floor unit

### Field of Invention

- The invention relates to a floor unit having a
- 5 mounting plate which can be placed onto the supporting floor structure and which comprises a base plate having knobs projecting therefrom, heating pipes which are insertable between the knobs and which extend across the floor, and a
  - 10 sheet steel floor plate which is placed onto the knobs and which is secured thereto by an adhesive.

### Background to the Invention and Prior Art

- Floor units of this kind are known. They serve to
- 15 manufacture prefabricated heating systems. The mounting plates are foamed from a plastics material and are placed onto the supporting floor structure such as a concrete floor. Flexible pipes made from a plastics material are fitted between
  - 20 the knobs so as to extend back and forth in the form of loops. The distance between the straight portions, extending back and forth, of the individual areas depends upon the local heat requirements, resulting in different distances
  - 25 which then effect uniform heating of the space or room. The ends of a heating pipe are connected to the forward flow line and the return flow line of a central heating system. Steel plates are coated on one side with an adhesive. The adhesive is applied
  - 30 by, for example, a spatula or a brush. These adhesive sides of the sheet steel plates are applied to, and pressed onto, the knobs. The sheet steel plates close the top of the structure comprising the mounting plates and the heating pipes and
  - 35 form a load-bearing floor cover. A further floor cover, such as a textile carpet or plastics sheets, is applied to the sheet steel plates.

- The sheet steel floor plates and the plates incorporating knobs, or steel and plastics material,
- 40 have greatly differing coefficients of thermal expansion. They can differ from one another by a maximum factor of 6. In practice, the sheet steel plates are not adequately and satisfactorily glued to the knobs on the mounting plates. Stresses are
  - 45 caused by thermal expansion and the glued joints can part. This can lead to corrugations or undulations and other defects. The sheet steel floor plates cannot be laid with spaces therebetween for the purpose of compensating for
  - 50 the thermal expansion. The floor covering, such as plastics sheets, applied to the sheet steel floor plates requires an underlay which is free from gaps and which is planar over at least a large area.

### Objects of the Invention

- 55 Based on this, the object of the present invention is to construct a floor unit of the type described so as to compensate for the different degrees of expansion caused by the different coefficients of thermal expansion.
  - 60 The invention
- In accordance with the invention, this object is

achieved in that the sheet steel floor plates have edge strips which project at two mutually abutting sides and which engage below the sheet steel floor plates of adjacent floor units.

- 65 Advantageously, the edge strips comprise sheet metal strips which have a smaller thickness than that of the sheet steel floor plates themselves and which are placed below the latter and are welded thereto.

- 70 These projecting portions result in mutual overlap of the sheet steel floor plates. They rest on one another on these projecting portions and support one another. As will be stated, they can then be glued to one another. The floor units which are located in, for example, a room, are then interconnected in a manner which can be compared with the seamless welding of railway lines. The sheet steel plates have a thickness in
- 80 the range of approximately 1.5 to 2.5 mm, preferably 2 mm. The edge strips have a thickness of approximately 0.5 mm. If the sheet steel floor plates of adjacent floor units should nevertheless be displaced relative to one another as a result of thermal stresses, this leads to gap having a depth no greater than the thickness of the sheet steel floor plate. A shallow gap of this kind does not have any disadvantageous results.

- Advantageously, the two projecting edge strips
- 90 comprise a single sheet metal member and thus form an angled member. In an advantageous development, the ends of the two limbs of this angled member are set back relative to the sheet steel floor plate by an amount corresponding to the projecting portion. The projecting edge strips of the next adjacent floor unit would otherwise be pushed under them. A specific dimension cannot be prescribed for the projecting portion which has been mentioned several times. A dimension of
- 95 approximately 30 to 50 mm is recommended for the projecting portion in the case of a sheet steel floor plate having an edge length of approximately 300 to 400 mm.

- The edge strips located below the sheet steel floor plate are welded thereto. Spot-welding is recommended for this purpose.

- As already mentioned, the essence of the invention resides in the fact that the sheet steel floor plates of adjacent floor units overlap one another at their edge strips. It is within the scope of the invention to glue the sheet steel floor plates to one another at each overlap or, alternatively, at greater distances apart, such as at each fifth overlap. The first case results in a very strong
- 110 connection. However, it requires the individual sheet steel floor plates to be glued to the knobs of the mounting plates in a satisfactory and permanent manner. The stresses caused by the differing thermal expansion act upon the fluid joint on each knob. Larger areas separated from one another result in the second case. The individual surfaces can be displaced relative to one another at the overlaps which are not glued to one another. This compensates for the thermal
- 115 stresses. Nevertheless, the gaps, or the changes in the width of the gaps, caused by the thermal

stresses, do not have any detrimental effect. As stated, the depth of the gaps is only approximately 2 mm.

The invention will now be further described with reference to the embodiment illustrated in the drawings.

#### In the Drawings

Fig. 1 is a partially sectioned, fragmentary perspective view of a supporting floor structure with floor units in accordance with the invention located thereon,

Fig. 2 is a perspective illustration of a sheet steel floor plate with the edge strips welded to the underside thereof,

Fig. 3 is a section taken along the line III—III of Fig. 2,

Fig. 4 is a plan view of adjacent sheet steel floor plates with the edge strips located therebelow,

Fig. 5 is a section taken along the line V—V of Fig. 1.

#### Description of Embodiment

Fig. 1 shows various floor units 12. They are located on the supporting floor structure 14 which is, for example, a conventional concrete floor. The floor units 12 include the mounting plates 16 incorporating the knobs 18. The knobs 18 have different diameters. The flexible heating pipes 12 extend between the knobs. The sheet steel floor plates 22 are glued to the knobs 18. A floor covering 24 is in turn glued to the sheet steel floor plates and comprises, for example, plastics sheets, a carpet or the like. Fig. 1 also shows the edge strips 26.

The edge strips are shown particularly clearly in Figures 2 to 4. The edge strips 26 are integrally made in pairs to form an angled member 28 which is connected to the sheet steel floor plate 22 by spot-welding 30. The edge strips 26 project beyond the sheet steel floor plate 22 by a length 32 and their ends are at the same time set back relative to the sheet steel floor plate 22 by a dimension 34. The projecting length 32 and the dimension 34 are identical to one another. Consequently, as is shown particularly in Fig. 4, only the sheet steel floor plates 22 overlap the edge strips 26, and the edge strips 26 do not overlap one another. Fig. 4 also shows that the smaller diameter knobs 18 are in each case located below an edge strip 26.

Fig. 5 is a cross section through the general view of Fig. 1. The sheet steel floor plates 22 resting on the knobs 18 will be seen. The floor plates are connected to the knobs by the adhesive

36. Fig. 5 also shows that, and how, the sheet steel floor plates 22 overlap the edge strips 26. In the illustrated embodiment, a glued joint 36 is provided at each second overlap. In practice, the glued joints 36 will be provided at greater distances apart. This results in larger rigid surfaces which can shift at the non-glued overlaps in order to compensate for thermal stresses.

#### CLAIMS

1. A floor unit having a mounting plate which can be placed onto the supporting floor structure and which comprises a base plate having knobs projecting therefrom, heating pipes which are insertable between the knobs and which extend across the floor, and a sheet steel floor plate which is placed onto the knobs and which is secured thereto by an adhesive, characterized in that sheet steel floor plates (22) have edge strips (26) which project at two mutually abutting sides and which engage below the sheet steel floor plates (22) of adjacent floor units (12).
2. A floor unit as claimed in claim 1, characterized in that the edge strips (26) comprise sheet metal strips having a smaller thickness than that of the sheet steel floor plates (22) and are laid below the latter and are welded thereto.
3. A floor unit as claimed in claim 1 or 2, characterized in that the edge strips form an angled member (28).
4. A floor unit as claimed in claim 3, characterized in that the ends of the two limbs of the angled member (28) are set back relative to the sheet steel floor plate (22) by an amount (34) corresponding to the projecting length (32).
5. A floor unit as claimed in claim 2, characterized in that the edge strips (26) are connected to the sheet steel floor plate (22) by spot-welding (30).
6. A floor unit as claimed in claim 1, 2 or 5, characterized in that the sheet steel floor plates (22) and the edge strips (26), engaging therebelow, of the sheet steel floor plates (22) of adjacent floor units (12) are glued to one another.
7. A floor unit as claimed in claim 3, characterized in that the sheet steel floor plates (22) and the edge strips (26), engaging therebelow, of the sheet steel floor plates (22) of adjacent floor units (12) are glued to one another.
8. A floor unit as claimed in claim 4, characterized in that the sheet steel floor plates (22) and the edge strips (26), engaging therebelow, of the sheet steel floor plates (22) of adjacent floor units (12) are glued to one another.